REMARKS/ARGUMENTS

Overview of the invention :

The invention discloses a method to manufacture a liftoff resist from a single material. Conventional photoresist (positive or negative) is patterned in the conventional way. Then, the top surface (only) is exposed to a beam of ions whose energy is too low to cause sputtering. Said ions penetrate a short distance beneath the photoresist surface, forming there a hardened layer. This is followed by exposure to ozone which erodes all exposed photoresist surfaces except the aforementioned hardened layer, causing the latter to overhang the unhardened layer beneath it, thereby rendering it suitable for subsequent use as a liftoff resist.

Reconsideration is requested of all rejections based on 35 U.S.C. 103:

Examiner continues to rely on Yamada et al. (US 4.904,619) for this rejection

In our response to the first rejection we provided three reasons why the present invention is not obvious in light of Yamada showing, in fact, that it differs significantly from Yamada. Said reasons were as follows:

(A) Yamada does not teach exposing the photoresist layer to an ion beam such that the energy of the ion beam is too low to sputter the photoresist layer.

(B) Yamada does not teach an ion beam of the claimed voltage.

(C) Bloomstein does not teach a change in dimension in the resist exposed to ozone.

Examiner's responses (followed by our rebuttals) are as follows:

(A) Yamada, in col. 5. lines 1-10, discloses irradiating with a sputter-ion beam at the claimed energy level to harden the surface of the photoresist. Yamada does not teach sputtering the photoresist layer.

Our response: In col. 5. lines 1-10, Yamada states "...its resist surface is hardened by sputter etching...". The term 'sputter etching' means removal of material through sputtering. Thus, Yamada DOES teach sputtering the layer and the removal of a certain amount of material is a byproduct of Yamada's hardening method. The whole point of the present invention is that we claim a hardening process that explicitly excludes any removal of material.

(B) Yamada, in col. 5. lines 1-3, discloses that the photoresist surface is subjected to a sputter ion beam with an RF power of about 20W. An RF power of 20 watts in a sputter ion beam system corresponds to an ion beam voltage of about 200 volts (claimed range).

Our response: As examiner knows, power is the product of voltage and current (times a power factor if the load is either significantly inductive or significantly capacitive). It follows that, if Yamada is using 20W at 200 volts, his current must be about100 mA. Thus, unless examiner can show where, precisely, Yamaha teaches a sputtering current of about 100 mA, her statement that '20W corresponds to 200 volts' has no basis whatsoever.

(C) Bloomstein is not depended on to show a change in dimension in the photoresist.

Our response: Bloomstein discusses exposure of a resist to ozone This is not relevant to the arguments we have presented above.

In summary, Yamada teaches a method to manufacture a liftoff resist by using high energy sputtering. This results in a resist having a trapezoidal cross-section. Yamaha sputters away some of the material as it is being hardened. The present invention teaches use of a low energy ion beam to harden the resist surface, with no material being removed during the hardening process, followed by shrinkage of the unhardened portion by exposing it to ozone.

Therefore, applicants contend that neither Yamada, nor Yamada in combination with Bloomstein, Furihata and/or Leuschner, teaches or suggests the claimed invention

Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Respectfully submitted,

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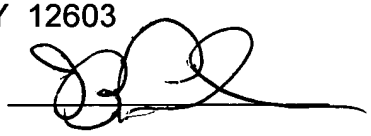
By 

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